

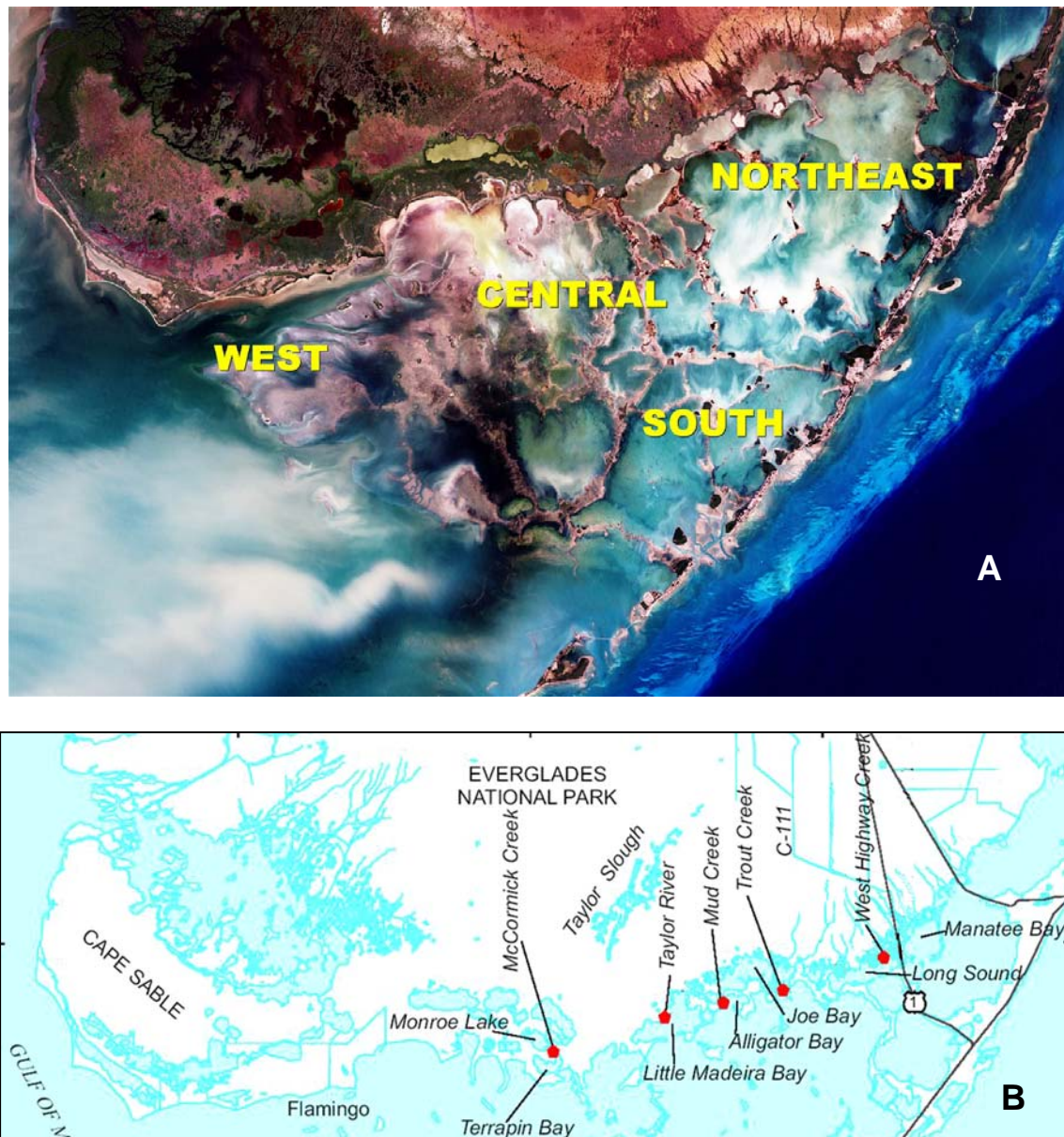
# CHAPTER 1: INTRODUCTION

## BACKGROUND

Florida Bay is a shallow subtropical estuary on the south coast of Florida in Monroe County (**Figure 1**) bordered on the east by the Florida Keys and on the west by the Gulf of Mexico. The bay and its watershed are located primarily within the boundaries of Everglades National Park and constitute the state's largest estuary system, covering approximately 850 square miles (2,200 sq. kilometers). Florida Bay is a priority water body for the development of a Minimum Flow and Level (MFL) norm under Section 373.042(2), Florida Statutes (F.S.). Because it is a large, biologically diverse system influenced primarily by a natural watershed, scientists and resource managers agree that MFLs for the resource should focus largely on those bay subregions influenced by flow from the state's managed canal system. Accordingly, the present report documents the methods and technical analyses used by the South Florida Water Management District (SFWMD or District) to develop MFLs for the northeastern section of Florida Bay, which is influenced primarily by flows from the regional canal system into Taylor Slough (**Figure 1**).

The MFLs for Florida Bay are being developed pursuant to the requirements contained within the "Florida Water Resources Act," specifically Sections 373.042 and 373.0421, F.S., as part of a comprehensive water resources management approach intended to ensure the sustainability of water resources. The proposed MFLs are not a "stand-alone" resource protection tool but should be considered in conjunction with all other resource protection responsibilities granted to the water management districts by law, such as consumptive use permitting, environmental resource permitting, water shortage management and water reservations. A model framework identifying the relationships among these tools was used in MFL development and is discussed in the present document. Pursuant to Chapter 373.0361 F.S., the District has completed regional water supply plans that include recommendations for establishment of MFLs and strategies for recovery and prevention. In addition, achievement of the required flows and water levels is a long-term component of the Comprehensive Everglades Restoration Plan (CERP). Establishment of MFLs alone is not intended to be sufficient in itself to maintain a sustainable resource or to protect it from significant damages during the broad range of water conditions occurring in the managed system. Setting a minimum flow is viewed more as a starting point to define water needs for preventing significant harm. The necessary hydrologic regime for restoration of the Florida Bay ecosystem must be defined and implemented also through regional water supply plans, the use of water reservations, and other water resource protection tools that will ultimately define the water needs to sustain a healthy ecosystem.

As the first formal step in establishing MFLs for Florida Bay, the present report presents the scientific and technical framework for determining MFLs based upon the best available information (an approach applicable as well to other surface water and groundwater within the District). The report also describes the development of a methodology and technical information through use of relevant supporting data and analyses. The draft document is to undergo independent scientific peer review pursuant to Section 373.042, F.S., and rule development workshops are to be held to discuss MFL-related concepts for the bay.



**Figure 1.** Location and Major Features of Florida Bay. Top (A): LANDSAT-7 extended thematic mapper image showing its shallow-bank bathymetry and principal subregions (Florida Bay Science Program 2003). Bottom (B): Location of gauged inflow to northeastern and central Florida Bay (from Hittle et al. 2000).

## **PROCESS AND BASES FOR ESTABLISHMENT OF MINIMUM FLOWS AND LEVELS**

### **Process Steps and Activities**

The process for establishing a minimum flow for the northeastern subregion of Florida Bay is as follows:

- Develop a methodology and technical basis for MFL criteria.
- Draft an MFL technical document.
- Conduct scientific peer review of the technical document pursuant to Section 373.0421, F.S.
- Revise the report as recommended by the peer review panel; submit report to the peer review panel again and to the public and appropriate agencies for additional comments; and incorporate revisions into final report.
- Conduct rule development workshops, including development of potential criteria.
- Present a recommended rule to the District's Governing Board for adoption.

### **Legal and Policy Bases for Establishment of Minimum Flows and Levels**

Section 373.042(1), F.S., requires that the water management districts establish MFLs for surface waters and aquifers within their jurisdiction. According to this statute, the minimum flow is defined as the "...limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area..." The statute further directs water management districts to use the best available information in establishing MFLs. Each water management district must also consider, and at its discretion may provide for, the protection of non-consumptive uses in the establishment of MFLs. In addition, a baseline condition for the protected resource functions must be identified through consideration of changes and of structural alterations in the hydrologic system.

The following sections outline the legal and policy factors (Appendix A) relevant to establishing MFLs under Florida Statutes. In summary, the following questions are addressed:

- What are the priority functions of each water resource, and what is the baseline condition for the functions being protected?
- What level of protection for these functions is provided by the MFL significant harm standard?

### **Relevant Water Resource Functions**

Each surface water body or aquifer serves an array of water resource functions that must be considered as input factors for the definition of the basic concept of significant harm when setting an MFL. The term "water resource" is used throughout Chapter 373, F.S. Water resource functions protected under this statute are broad and varied, as illustrated in Section 373.016, F.S., and include flood control, water quality protection, water supply and storage, navigation, recreation and fish and wildlife protection. In turn, the State Water Resource Implementation Rule, Section 62-40.405, Florida Administrative Code (F.A.C.), outlines specific factors to

consider, including protection of natural seasonal changes in water flows or levels, water levels in aquifer systems and environmental values associated with aquatic and wetland ecology. Other specific considerations include the following:

- Fish and wildlife habitat and the passage of fish.
- Maintenance of supply and storage of fresh water.
- Water quality.
- Estuarine resources.
- Transfer of detrital material.
- Filtration and absorption of nutrients and pollutants.
- Sediment loads.
- Recreation in and on the water.
- Navigation.
- Aesthetic and scenic attributes.

The District's Governing Board determines which resource functions to consider in establishing MFLs—an analysis requiring a comprehensive assessment of the sustainability of the resource itself as well as of the resource's role in sustaining overall regional water resources. Chapter 3 of the present document describes in detail the relevant water resource functions of the Florida Bay.

### **Considerations and Exclusions: Baseline Conditions to Protect Water Resource Functions**

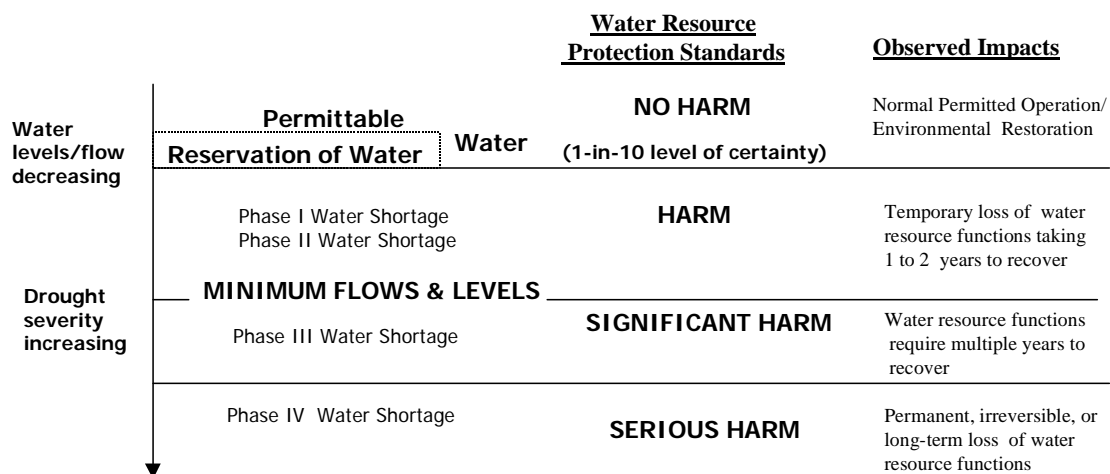
Once the water resource functions to be protected by a specific MFL have been defined, the baseline resource conditions for assessing significant harm must be identified. Considerations for making this determination are set forth in Section 373.0421(1)(a), F.S., which requires that the water management districts, when setting an MFL, consider changes and structural alterations that have occurred to a water resource. Likewise, Section 373.0421(1)(b), F.S., recognizes that certain water bodies no longer serve their historical function and that recovery of these water bodies to historical conditions may not be feasible. These provisions are discussed in Chapter 3, examining their applicability to the minimum flows proposed for Florida Bay.

This consideration is one of the most complex policy driven portions of the MFL development for the Governing Board. It potentially includes balancing of economic feasibility and impacts of removing or otherwise addressing existing changes or structural constraints currently in the system. These constraints have developed over time through a series of public policy decisions that if reversed could have far reaching implications, such as removal of roads or bridges, reduction of public water supplies, or flood impacts. The evaluation conducted herein does not address this eventual policy determination by the Governing Board. This evaluation identifies the flow and salinity relationships and the water resource implications of managing the hydrology under various conditions.

### **Level of Protection for Water Resource Functions Provided by the MFL Standard of Significant Harm**

The overall purpose of the Florida Water Resources Act (Chapter 373, F.S.) is to ensure the sustainability of water resources of the state (Section 373.016, F.S.). To carry out this responsibility, Chapter 373 provides the District with several tools with varying levels of resource protection standards. MFLs are a part of this framework. The role of MFLs, the protection that MFLs offer, and the similarity and differences between MFLs and other water resource tools available to the District are important concepts. The scope and context of MFL protection revolve around the goal of preventing significant harm. The following discussion provides some context to the MFLs statute, including the significant harm standard, vis-à-vis other water resource protection statutes.

Resource sustainability is the overarching objective of all water resource protection standards (Section 373.016, F.S.) and tools. Each water resource protection standard must fit into a statutory niche to achieve this overall goal. A few of the many available resource protection tools are the reservation of water for fish and wildlife or for health and safety purposes (Section 373.223[3], F.S.) and the use of aquifer zoning to prevent undesirable uses of the groundwater (Section 373.036[4]–[5], F.S.). Interacting with these and other water resource protection standards and tools is the idea of three distinct levels of possible harm to the resources—harm, significant harm and serious harm—which are relative resource protection terms, each playing its role in the ultimate goal of achieving a sustainable water resource. For instance, pursuant to Parts II and IV of Chapter 373, surface water management and consumptive use permitting regulatory programs and tools must prevent harm to the water resource. And water shortage statutes dictate that in order to prevent serious harm to the water resources, permitted water supplies must be restricted from use at times (perhaps by applying the tool of water shortage declaration). In between harm and serious harm, MFLs are set at the point at which significant harm to the water resources or to the ecology would occur if appropriate tools were not applied. The SFWMD has proposed that the conceptual relationship among the various levels of harm be represented as depicted in **Figure 2**.



**Figure 2.** Conceptual Relationships among the Terms Harm, Significant Harm and Serious Harm.

The general narrative definition of significant harm proposed by the SFWMD (Chapter 40E-8.021[28], F.A.C.) for the water resources of an area is as follows:

Significant Harm means the temporary loss of water resource functions, which result from a change in surface or ground water hydrology, that takes more than two years to recover, but which is considered less severe than serious harm. The specific water resource functions addressed by a MFL and the duration of the recovery period associated with significant harm are defined for each priority water body based on the MFL technical support document.

The specific technical analysis under review focuses on relatively low flow and high salinity conditions and attempts to identify thresholds of salinity exposure that impact ecological structure or function of valued ecosystem components such that recovery of these attributes is likely to span at least two years. The requirement that the level of resource impact associated with significant harm take more than two years to recover is a guide only, and is intended to indicate that “significant harm” is not an impact level that occurs under average or natural hydrologic conditions. Instead, “significant harm” refers to effects that occur during dry hydrologic conditions at a level and frequency as a result of man-made withdrawals that cause increasingly severe, cumulative effects on water resources, e.g. if an exceedance of the threshold condition reoccurs within an interval that is shorter than the time needed for that resource to recover.

### **Other Levels of *Harm* Considered in Florida Statutes**

In order to give context to the proposed significant harm standard, a discussion is provided below regarding the two other levels of harm—as applied in the conceptual model for consumptive use permitting (harm) and in the conceptual model for the declaration of a water shortage (serious harm).

#### **Harm Standard in the Consumptive Use Permitting Role**

The resource protection criteria used for consumptive use permitting (CUP) are based on the level of impact considered as causing harm to the water resource. These criteria are applied to various resource functions to establish the range of hydrologic change that can occur without harm. The hydrologic criteria include components of level, duration and frequency and are used to define the amount of water that can be allocated from the resource. Together, the criteria on saltwater intrusion, wetland drawdown, aquifer mining and pollution prevention in Chapter 40E-2, F.A.C., define the harm standard for purposes of consumptive use allocation. These harm criteria are applied using climatic conditions that represent an assumed level of certainty. The 1-in-10 year drought level of certainty is also the water supply planning goal that was established in Section 373.0361, F.S. The standard for harm used in the CUP process is considered as the point at which adverse impacts to water resources can be restored within a period of one to two years of average rainfall conditions. These short-term adverse impacts are addressed for the CUP program, which calculates allocations to meet demands for use during relatively mild dry season events, defined as the 1-in-10 year drought.

#### **Serious Harm Standard in the Water Shortage Declaration Role**

Pursuant to Section 373.246, F.S., water shortage declarations are designed to prevent serious harm from occurring to water resources. Serious harm, the ultimate harm to the water resources as contemplated under Chapter 373, F.S., can be interpreted as long-term, irreversible or permanent impacts to the water resource. Declaration of water shortages is the tool used by the Governing Board to prevent serious harm—impacts such as those experienced in drought events more severe than the 1-in-10 level of drought used in the CUP criteria.

When drought conditions exist, water users increase withdrawals to supplement water not provided by rainfall, typically for irrigation or outdoor use. In general, the more severe the drought, the more supplemental water is needed. These increased withdrawals increase the potential for serious harm to the water resource because of decreased rainwater input into the resource combined with increased demand by users. Thus, the SFWMD has implemented its water shortage authority to restrict consumptive uses by applying the concept of equitable distribution between users and the water resources themselves (Chapter 40E-21, F.A.C.).

Under this program, different levels or phases of water shortage restrictions are imposed relative to the severity of drought conditions. The four phases of the current water shortage restrictions are based on relative levels of risk posed to resource conditions leading up to serious harm impacts. Under the SFWMD's program, Phase I and Phase II water use restrictions include conservation techniques and restrictions on minor uses such as car washing and lawn watering, designed primarily to prevent such outcomes as localized recoverable damage to wetlands or short-term inability to maintain water levels needed for restoration. In turn, Phases III and IV require more rigorous usage cutbacks associated with some level of economic impact to users, such as restrictions on agricultural irrigation.

## **MFL RECOVERY AND PREVENTION STRATEGY**

The District's MFLs are implemented through a multifaceted recovery and prevention strategy designed pursuant to Section 373.0421(2), F.S. An MFL recovery and prevention strategy will be developed and will be included in the present document prior to administrative rulemaking. Section 373.0421(2), F.S., provides that if it is determined that water flows or levels are presently below the MFL standard or that they will fall below an established MFL standard within the next 20 years, the water management district must develop and implement a recovery or prevention strategy, whichever would apply. The 20-year period should coincide with the regional water supply plan horizon for the area, and the strategy is to be developed in concert with that planning process.

The general goal of the recovery and prevention strategy is to take actions to achieve the MFL criteria while continuing to provide sufficient water supplies for all reasonable-beneficial demands (reasonable-beneficial uses entail water use in such quantity as is necessary for economic and efficient utilization for a purpose and in a manner both reasonable and consistent with the public interest). If the existing condition of the resource is below the MFL, then recovery to the MFL must be achieved "as soon as practicable." A water management district's ability to implement proposed actions punctually is influenced by many different factors, including funding availability, detailed design development, permissibility of regulated actions, land acquisition and the implementation of updated permitting rules.

From a regulatory standpoint, depending on the existing and projected flows or levels, either water shortage declaration triggers or interim consumptive use permit criteria, or both, may be recommended in the recovery and prevention strategy. The approach varies depending on whether the MFL criteria are currently exceeded and on the specific cause of the MFL exceedance—e.g., consumptive use withdrawals, poor surface water conveyance facilities or operations, overdrainage or a combination of these factors.

Incremental measures to achieve the MFL must be included in the recovery and prevention strategy, along with a timetable for the provision of water supplies necessary to meet reasonable-beneficial uses. Such measures include conservation and other efficiency procedures and the development of additional water supplies. In accordance with Chapter 373, F.S., these measures must make water available "concurrent with, to the extent practical, and to offset reductions in permitted withdrawals, consistent with the provisions of this chapter." The determination of what

is “practical” in identifying measures for concurrently replacing water supplies will most likely be made through consideration of economic and technical feasibility of the potential options available.